

NON-PUBLIC?: N
ACCESSION #: 9002130341
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Hope Creek Generating Station PAGE: 1 OF 8

DOCKET NUMBER: 05000354

TITLE: Turbine Trip on Moisture Separator High Level Results in Reactor
Scram Due to Equipment Deficiencies and Personnel Error
EVENT DATE: 01/06/90 LER #: 90-001-00 REPORT DATE: 02/05/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 097

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: R.B. Cowles, Senior Staff TELEPHONE: (609) 339-5264
Engineer - Technical

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 1/6/90 at 0120, during performance of a surveillance procedure which tests the Main Turbine Combined Intermediate Valves (CIV), the "A" Moisture Separator experienced a high level condition. In response to this high level condition, the associated dump valve opened, but not in time to prevent a turbine trip on moisture separator high level. Immediately following the turbine trip, the reactor scrambled on a Turbine Control Valve Closure signal from the Reactor Protection System. All control rods were verified to be inserted, and plant systems responded as expected, with minor exceptions as noted in the text of this report. Investigation subsequent to the scram determined that multiple causes combined to result in the scram - moisture separator level controllers which were not optimally tuned and the cycling of a CIV prior to stabilization of moisture separator level after cycling a previous CIV. Corrective actions included tuning of the moisture separator drain

control instrumentation loops, procedurally increasing the time between cycling of CIV's during the subject surveillance, counselling the Nuclear Control Operator (NCO, RO licensed) who performed the surveillance, and including a review of the event during the next licensed operator requalification cycle.

END OF ABSTRACT

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PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)
Main Turbine (EIS Designation: TA)
Reactor Protection System (EIS Designation: JC)
Moisture Separator (EIS Designation: SN)
Feedwater System (EIS Designation: SJ)
Condensate System (EIS Designation: SD)

IDENTIFICATION OF OCCURRENCE

Turbine Trip on Moisture Separator High Level Results in Reactor Scram
Due
to Equipment Deficiencies and Personnel Error

Event Date: 01/06/90
Event Time: 0120
This LER was initiated by Incident Report No. 90-001

CONDITIONS PRIOR TO OCCURRENCE

Plant in OPERATIONAL CONDITION 1 (Power Operation), Reactor Power 97%, Unit Load 1062 MWe. Output limited by feedwater heaters 1C and 2C being out of service.

DESCRIPTION OF OCCURRENCE

On 1/6/90 at 0120, during performance of a surveillance procedure which tests the Main Turbine Combined Intermediate Valves (CIV), the "A" Moisture Separator experienced a high level condition. In response to this high level condition, the associated dump valve opened, but not in time to prevent a turbine trip on moisture separator high level. Immediately following the turbine trip, the reactor scrammed on a Turbine Control Valve (TCV) closure signal from the Reactor Protection System (RPS). All control rods were verified to be inserted, and plant systems responded as expected, with the following exceptions:

1. The "B" Secondary Condensate Pump (SCP) minimum flow valve failed to open, resulting in a trip of the "B" SCP on low flow.
2. Post-accident monitoring (PAMS) pressure recorders "A" and "B" did not function properly.
3. Redundant Reactivity Control System (RRCS) Division I, channel "B" failed to trip.

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DESCRIPTION OF OCCURRENCE, CONT'D

The "H" and "P" Safety Relief Valves (SRVs) lifted as designed to control reactor pressure, and vessel level decreased to approximately 10" (narrow range indication) during the course of the transient, well above any Emergency Core Cooling System actuation levels. Vessel level was restored using the "A" Reactor Feed pump. Plant parameters were stabilized within 30 minutes. A four hour non-emergency report was made to the NRC Operations Center IAW 10CFR50.72, and an investigation was initiated to determine the cause of the scram. Due to a scheduling error by the LER Coordinator, this report is being submitted 1 day late.

ANALYSIS OF OCCURRENCE

On 1/6/90 at 0045, the control room Nuclear Control Operator (NCO, RO licensed) initiated performance of the weekly Turbine Overspeed Protection System Operability Test procedure. The purpose of this surveillance is to demonstrate the operability of the main turbine overspeed protection system by cycling the Turbine Stop Valves (TSVs) and the Combined Intermediate Valves (CIVs) as required by technical specifications.

The first caution in the procedure stated that "At least one minute between valve operations shall be exercised to allow the EHC System time to stabilize.". The TSVs were cycled with satisfactory results, and at 0117:20, the NCO cycled CIV-#1 closed. 31 seconds after completing the cycling of CIV-#1, the NCO began to cycle CIV-#4. At 0119:36, a "Moisture Separator "A" Emergency Dump Tank High Level" alarm was received, and at 0120:19, the turbine tripped on moisture separator high level and the reactor scrammed on a TCV closure signal via RPS.

Investigation subsequent to the scram focused on two primary areas; the instrumentation for moisture separator level control and the NCO's performance of the surveillance test.

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ANALYSIS OF OCCURRENCE, CONT'D

1. Moisture Separator Level Control Instrumentation

Refer to Attachment 1. Moisture Separator level is normally controlled via the cycling of level control valves LV-1364A, B, and C, which route condensate from the Moisture Separator Drain Tank to Feedwater Heaters 5A, B and C via individual 8" lines. In the event of a high Drain Tank level, the Emergency Dump Valve opens and drains directly to the Main Condenser via a single 8" line. The cycling of a CIV induces a significant transient on the associated Moisture Separator, and a swing in level during the course of cycling a CIV is normal and expected, however, not as severe as was experienced in this event.

Following the scram, the response and settings of the Drain Tank level control system (instrumentation and valves) was checked. Investigation determined that a variety of factors contributed to a less than adequate response of the level control system for "A" Moisture Separator:

A. Level Controller LIC-1040A was determined to be adjusted to a less than optimum setting, which led to a sluggish response of LV-1364A and LV-1364B above the 50% open position. There is no recurring task for preventive maintenance of this controller or tuning of the entire control loop.

B. The air supply to the positioner for LV-1364C was isolated, as such, this valve did not open in response to the Moisture Separator high level transient. LV-1364C was worked several times during the station 2nd refueling outage. Subsequent investigation has determined that the air supply to the positioner was not properly restored by Maintenance Department personnel following one of these maintenance activities.

C. The response for Emergency Dump valve LV-1039A was sluggish above the 50% open position. Again, the tuning of the level control loop for this valve was less than optimum. All instruments in this loop had been individually calibrated during September of 1989, however, a total loop functional test was not required to be performed.

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ANALYSIS OF OCCURRENCE, CONT'D

Lastly, the response of the Moisture Separators during previous testing was reviewed. During the course of interviews with Operations Department control room personnel following the scram, it was determined that the "A" Moisture Separator has experienced level control oscillations in the past during CIV cycling. This finding was confirmed by review of plant process computer printouts from past CIV testing. It was apparent that the personnel performing the tests waited up to three minutes between CIV cycles to allow Moisture Separator levels to stabilize. This system response, however, was considered normal and as such, a work request was not initiated to troubleshoot the level control system.

Performance of Surveillance Procedure by NCO

The NCO who performed the testing had done so on many prior occasions. Post scram analysis determined that on this occasion, the NCO deviated from the surveillance procedure during performance of the test. The NCO did not wait 1 minute between cycling CIV's, as required by the procedure for stabilization of EHC system pressures. He did, however, verify EHC system stabilization prior to cycling CIV-#4. As mentioned above, during previous tests, operators had waited up to 3 minutes for Moisture Separator levels to stabilize. It should be noted that the procedure did not specify a waiting period for Moisture Separator stabilization.

APPARENT CAUSE OF OCCURRENCE

All of the above factors combined to result in the scram, and it is not feasible to reconstruct the event and determine which factor played the primary role in the final result. As such, the root cause of this event has been classified as a combination of equipment failure and cognitive personnel errors.

PLANT TRANSIENT RESPONSE

1. The "B" Secondary Condensate Pump Minimum Flow Valve did not open due to a failed air line on the valve actuator. The severe service of these valves subjects the valve and actuator to significant movement when cycled, making the actuator air lines failure prone. The air line was replaced and the valve retested satisfactorily.

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2. PAMS Pressure Recorder "A" was inoperable prior to this event due to recorder not advancing properly. The recorder was repaired and returned to service on 1/11/90.

PAMS Pressure Recorder "B" did not ink properly during this event.

The pens were replaced and the recorder was returned to service.

3. A review was conducted of the failure of RRCS Division I, Channel B failing to trip. This channel should trip when reactor pressure reaches 1071 PSIG. During the course of this event, the highest reactor pressure seen was 1075 PSIG. Troubleshooting of associated RRCS pressure instrumentation found no problems, and the Channel "B" input was tested satisfactorily. It was concluded that Channel "B" did not trip because, with instrumentation tolerances considered, reactor pressure did not quite reach the setpoint for Channel "B" RRCS.

PREVIOUS OCCURRENCES

This is the first occurrence of a scram (or other type of reportable occurrence) at Hope Creek as a result of level control problems with a Moisture Separator. Additionally, a review of in-house experience indicates no history of significant operational type problems with the Moisture Separators.

SAFETY SIGNIFICANCE

The potential safety impact of this event was minimal, as a plant scram is an analyzed event, and with minor exceptions, all systems responded as expected. None of the abnormal system responses posed a threat to the ability to achieve and maintain safe shutdown conditions. This event posed no threat to the health and safety of the general public.

CORRECTIVE ACTIONS

1. The "A" and "B" Moisture Separator instrumentation loops were tuned while at 25% reactor power following plant restart and the subject surveillance was again performed. Level control of the Moisture Separators was observed during power ascension from restart to 100%, and no deviations from expected responses were noted.
2. Planning Department will initiate a recurring task to calibrate Moisture Separator Drain Tank level controller (LIC-1040A).

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CORRECTIVE ACTIONS, CONT'D

3. Systems Engineering will develop a loop response functional test for the Moisture Separator level control instrumentation.

4. The General Manager and Operations Manager have communicated their expectations to all operators and supervisors regarding deficiencies noted in this report.

5. The NCO who performed the subject surveillance test was counselled with regards to his actions in not adhering to the procedure.

6. Systems Engineering is pursuing a resolution to the movement of Secondary Condensate Pump Minimum Flow Valves.

7. This event will be reviewed with all licensed personnel by the Nuclear Training Department during the next licensed operator requalification cycle.

8. The Maintenance Manager will review control of air supplies to valve positioners following maintenance on air operated valves with all Maintenance Department personnel.

Sincerely,

J.J. Hagan
General Manager -
Hope Creek Operations

RBC/

SORC Mtg. 90-013

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Figure "Attachment 1 Moisture Separator Level Control Instrumentation" omitted.

ATTACHMENT 1 TO 9002130341 PAGE 1 OF 1

PSE&G

Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge,
New Jersey 08038

Hope Creek Operations

February 5, 1990

U. S. Nuclear Regulatory Commission
Document Control Desk

Washington, DC 20555

Dear Sir:

HOPE CREEK GENERATING STATION
DOCKET NO. 50-354
UNIT NO. 1
LICENSEE EVENT REPORT 90-001-00

This Licensee Event Report is being submitted pursuant to the requirements of 10CFR50.73 (a) (2) (iv).

Sincerely,

J.J. Hagan
General Manager -
Hope Creek Operations

RBC/

Attachment
SORC Mtg. 90-013

C Distribution

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